Zero Retries issue 0051 2022-06-17

Technological innovation in Amateur Radio - Data Communications; Space; Microwave… the fun stuff! The Universal Purpose of Ham Radio is to have fun messing around with radios - Bob Witte K0NR. Ultimately, amateur radio must prove that it is useful for society - Dr. Karl Meinzer DJ4ZC. We are confronted by insurmountable opportunities! - Pogo. Nothing great has ever been accomplished without irrational exuberance - Tom Evslin. Irrational exuberance is pretty much the business model of Zero Retries Newsletter - Steve Stroh N8GNJ. What's life without whimsy? - Dr. Sheldon Cooper.

Zero Retries is a unique, quirky little highly independent, opinionated, self-published email newsletter about technological innovation in Amateur Radio, for a self-selecting niche audience, that's free (as in beer) to subscribe.

About Zero Retries

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In this issue:

- **Request To Send**
- **A few updates to Zero Retries 0050 - Zero Retries Interesting Projects, Products, etc. - Part 1:**
- **Conferences**
- **Cost Is No Object**
- **HF Data Communications**
- **Interesting Projects In Development**
- **Join the *Fun* on Amateur Radio**
- **Closing The Channel**

Request To Send

Given that this is Part 2 of the second decadal update on *Zero Retries Interesting Projects, Products, etc*. that I've tried, and failed, to condense to a single issue, I've concluded it's foolish to ~~try~~ hope to cram all of that info into a single issue of Zero Retries, given the real world constraints of a newsletter intended to fit within an email. *Doubly so*, because while my previous attempt consumed *two* issues of Zero Retries, *this* attempt has now consumed *three issues* - Zero Retries 0050, 0051, and next week 0052 (at least in part).

Thus, for the next installment (Zero Retries 0060) of this ongoing project, I will make that issue a "highlights" reference to a blog post or web page that *doesn't have length constraints*. I did so for Zero Retries 0039 and Zero Retries 0040 - see Zero Retries Projects Etc. from ZR 0039 and 0040. That turned out reasonably well, and thus after Zero Retries 0052 publishes next week, I'll do the same for Zero Retries 0050, 0051, and 0052.

And, of course, all of this info is fodder for the Zero Retries book in progress.

Doing so also ties SuperPacket a bit tighter with Zero Retries. To us writers, there's a different "feel" in writing a blog post versus a web page versus a weekly newsletter - it's good to stretch the lesser-used writing muscles once in a while and I will be blogging more regularly on both SuperPacket and N8GNJ.org.

Finally, if you want to understand what drove me to create Zero Retries, check out this episode of HamRadioNow on YouTube.

I watched this episode to see my ARDC colleague John Hays K7VE interviewed about ARDC's grants program. Fast forward to approx. 1:11:04 when co-host Gary Pearce K4AAQ stated:

> The State of Digital… <snip> On the one hand… digital has exploded in Ham Radio; the options and the opportunities for digital… Yet on the other hand, only a few people are using anything digital except maybe for FT8. <snip> There's not much digital going on out there except for slow speed tippy typing <sic>. In terms of popularity, DMR, D-Star, Fusion are very much niche operations. Packet has almost disappeared.

(I suspect that K4AAQ will get "a bit" of pushback about characterizing DMR as a "niche operation".)

There's more of that discussion between the co-hosts and K7VE, but you get the idea. To be clear / fair, I'm *not dissing K4AAQ for his views*. I've met K4AAQ, like him, and admire his previous work of doing video recordings of the Digital Communications Conference (DCC), which was followed by Jason Johnston KC5HWB of HamRadio 2.0, and later TAPR directly when the DCC went virtual. I think K4AAQ does a generally good job of presenting Amateur Radio in a positive perspective and I enjoy HamRadioNow for its good production values and choice of topics.

I've reached out to K4AAQ to offer the "Zero Retries Perspective" and pointed him to the 50+ previous issues of Zero Retries that (in my opinion) generally refute his perspective of "there's not much digital going on [in Amateur Radio]". As I write this, I don't yet know if anything will come of that outreach.

de Steve N8GNJ

A few updates to Zero Retries 0050 - Zero Retries Interesting Projects, Products, etc. - Part 1:

- email via Amateur Radio - **Orv Beach W6BI:** *Winlink can be easily configured to move traffic over a [microwave, such as AREDN] mesh network, either point to point or to a post office on the*

network. Obviously it can move traffic faster via the network than any other digital mode Winlink supports. As a test, I've sent a 20KB message to a Winlink post office three hops away on the local network. To connect, send the message and disconnect took 10 seconds. Winlink users ought to be adopting networking in droves. It's enough motivation to build a network where none exists, even if it's just between a few supported agencies! And what's even better, you don't have to specify the path like you do digipeaters with packet and relays with VARA FM. The network knows the route to the destination! W6BI's point is quite valid, that AREDN and Winlink are highly complementary.

- Networking on VHF / UHF - **Tadd Torborg KA2DEW** reminded me about Xrouter, which, like BPQ32 and JNOS, integrates packet radio networking, TCP/IP connectivity, and much more. I had the mistaken impression that Xrouter was not being maintained, but apparently that's not the case as there was a major update earlier this year. (In later research, it turns out I was thinking of DigiNED not being maintained.)

- Interoperability via Internet - I meant to mention https://44net.cloud, which is a prototype / proof of concept for access into 44net via a Virtual Private Network. This service was set up by a member of ARDC's Technical Advisory Committee. I haven't yet set up a VPN using this service, but I plan to do so.

Conferences

Digital Communications Conference (DCC) - This is *the big one* for technological innovation in Amateur Radio (don't let the underwhelming web page fool you). This conference has been held for decades now and some of the most amazing developments in Amateur Radio were first revealed at DCC.

GNURadio Conference (GRCon) - This is the big one for open source Software Defined Radio, with a healthy mention of Amateur Radio.

DEF CON - The Hacker's Conference has a lot of activity regarding radio technology and a significant Amateur Radio presence.

Cost Is No Object

*Ya **gotta** dream at times…*

FlexRadio 6400M with Q5 Signal 5-Band High Power VHF/UHF Transverter - I told the story of this combination in The Ultimate Software Defined (Mostly Data) Radio in Zero Retries 0034. *Combine with a self-supporting collapsible tower (for easy antenna work) and assorted antennas.*

Fast Data - If I was ever offered a blank check to set up a cool, "high speed" data system for a small group of Amateur Radio Operators that wanted to have a data system that "just works, reasonably fast, pretty reliably", these are the elements of a system I would build in 2022:

- Icom IC-9700 as user radios because it includes the 1240-1300 MHz band and "Digital Data Mode" - 128 kbps and an Ethernet Interface.

- With every IC-9700, a Raspberry Pi to handle the DD data (TCP/IP applications such as Post Office Protocol (POP) email, Simple Mail Transfer Protocol (SMTP) email, Bulletin Board System (BBS), File Transfer Protocol (FTP), web server, web client, etc.)

- Icom ID-RP1200VD 1240-1300 MHz D-Star Digital Voice (DV) / Digital Data (DD) Repeater, configured for DD Mode. Installed on a great site (high tower or mountaintop), probably commercial, with very low-loss hardline and a high-gain, robust antenna, and a power amplifier rated for 100 kHz channel (repeater output power is a mere 10 watts). Part of the blank check would be to fund ongoing expenses for this system to be on a commercial radio communications site.

Earth-Moon-Earth (EME) aka Moonbounce - One of the ultimate fantasies of Amateur Radio… at least for *me*… is a bucolic summer night when Luna is full in the sky and having an antenna array pointed at Luna, and a radio system tuned to the most popular EME frequencies such as 144-148 MHz or 420-450 MHz and listening to the conversations from all over the world bouncing off Luna. Better antenna systems (which are more expensive) and power amplifiers make for more EME fun.

Starlink - In my opinion, Starlink is the most stable Internet access for Amateur Radio use because it's relatively immune to local Internet outages such as damage to fiber, power outages, etc. If you want to provide backup communications in your community / neighborhood via Winlink, APRS-IS, etc. , Starlink is ideal as it will work as long as it has power (and open sky). It's even more useful now that Starlink has enabled nomadic use.

HF Data Communications

fldigi Modes - Another suite of digital / data modes designed for HF (some of which, such as FSQ - Fast Simple QSO, are quite usable on VHF / UHF FM).

FreeDATA - Adaptation of the robust and spectrally efficient technology of FreeDV (digital voice) for text messages and data. *My thanks to Kevin Opalka KL1V for mentioning FreeDATA.*

JS8Call - One plaint about using the WSJT-X modes (see below) is that they're designed for "no chat, just log it" contacts. JS8Call adapts the highly robust WSJT-X technologies for chatting.

TAPR WSPR Boards - Inexpensive boards (kits), plus a Raspberry Pi, plus a modest HF antenna are all you need to operate a WSPR transmitter (beacon). The 10-meter (28.0 - 29.7 MHz) version can be used with the US Technician class license, thus that is a great project for new Amateur Radio Operators.

WSJT-X Modes - If you have any doubt that Amateur Radio has entered into a brave new world where digital / data modes will dominate Amateur Radio, just experiment with some of the WSJT-X modes to see just how amazing radio technology really is.

Interesting Projects In Development

"In development" is the operative phrase for items in this section; they're in the process of being readied for full release, or in the pre-crowdfunding stage, etc.

Digital Library of Amateur Radio & Communications (DLARC) - An initiative of the Internet Archive, funded by a major grant from ARDC. Based on their stated timeline, we should see an announcement by late 2022.

GroundSat - A concept (for which I could not find a definitive web page) of installing the equivalent of an Amateur Radio satellite linear transponder (such as uplink on 144 MHz and downlink on 420-450 MHz) on a terrestrial site such as a very high tower or mountaintop. This concept has been around for a long time, but (think…) I've seen recent (passing) references to it in Open Research Institute's Phase 4 Ground Station and Phase 4 Space projects.

ka9q-radio - A project by Phil Karn KA9Q that "virtualizes" a single Software Defined Receiver into multiple instances of receiver modules that enables an entire VHF / UHF band to be monitored simultaneously through the use of IP multicasting.

RHIZOMATICA High-frequency Emergency and Rural Multimedia Exchange System (HERMES) - Innovative built-from-scratch system that uses High Frequency (HF) radio as a backbone for exchanging email in *very* rural areas.

RPX-100 - A project by Austrian Amateur Radio Society (ÖVSV) to develop a 6 meter (50-54 MHz) / 2 meter (144-148 MHz) / 70 centimeter (440-450 MHz) radio based around a Software Defined Transceiver (LimeSDR Mini).

SOCORAD32 - Crowdfunded (in progress) hackable, open source ESP32 Amateur Radio board in portable form factor including voice and data.

Tangerine SDR - A project by TAPR to develop an HF Software Defined Transceiver with unique characteristics to support HamSCI.

VXSDR-20 - Crowdfunded (in progress) high performance Software Defined Transceiver covering 5-20 GHz.

General plug for Crowd Supply - As you'll see in this section, many innovative radio technology projects are choosing to crowdfund via Crowd Supply.

Zero Retries Interesting Projects, Products, etc. will be continued in Zero Retries 0052 next week.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with wireless technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*
- Pseudostaffer Dan Romanchik KB6NU for continuing to spot, and write about "Zero Retries Interesting" items on his blog that I don't spot on my own.
- Southgate Amateur Radio News consistently surfaces "Zero Retries Interesting" stories.
- The Substack email publishing platform makes Zero Retries possible. I recommend it for publishing newsletters.

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Email issues of Zero Retries are “instrumented” by Substack to gather basic statistics about opens, clicking links, etc. I don’t use such information in any way other than seeing that most subscribers actually do read Zero Retries.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted in beautiful Bellingham, Washington, USA
2022-06-17

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